Chimney Standards

A. Masonry Performance

1. *Conditions:* Mortar shall be free of cracks and crumbling. Mortar erosion must be less than $^1/_4$ an inch.[1]

2. *Materials:* Bricks, masonry units, and mortar.

3. *Installation or Repairs:* If mortar does not comply it shall be repointed to match existing mortar joints. If the mortar failure is due to moisture problems the source of the moisture shall be determined and measures shall be taken to prevent future masonry failures. Continuous weep holes, flexible sealants, and reinforcing poorly supported point loads and other means can be done to repair and prevent future failures.[2]

B. Flue Lining

1. *Conditions:* All chimneys shall have flue liners and those liners shall be in good condition.[3]

2. *Materials:* Clay lining or other listed chimney lining systems.

3. *Installation:* Flue linings shall be installed according to manufacturer's instructions. Damaged flue liners shall be replaced. If a new combustion heating system is installed the flue lining should be replaced as well to compliment the new heating system.

C. Chimney Hood

1. *Conditions:* The chimney hood shall have a height above the vent of at least 25 percent of the narrowest dimension of the vent.[4] Hoods shall also be free from spalling or rust.[5]

2. *Materials:* Stone, reinforced concrete cap, or sheet metal.

3. *Installation or Repairs:* Minor spalling shall be repaired. If more than small portions have spalled the hood should be replaced. If a metal chimney hood has excessive rust it shall be replaced according to manufacturer's instructions.

D. Spark Arrestors

1. *Conditions:* Vents for solid fuel burning appliances shall be equipped with a spark arrestor. The spark arrestor shall be clean and snugly fastened.

2. *Materials:* Spark arrestor

3. *Installation:* Spark arrestors shall be installed according to manufacturer's instructions. Dirt or clogs in the screen shall be removed.

---

[1] IHFA Rehabilitation Standards 1993, Section 3-4 and The Rehab Guide Volume 2: Exterior Walls, pg 24
[2] The Rehab Guide Volume 2: Exterior Walls, pg. 24
[3] Residential Rehabilitation Guide 2000, pg 23
[4] Residential Rehabilitation Guide 2000, pg 23
[5] Residential Rehabilitation Guide 2000, pg 24

Windows and Doors

1. Windows.

a. *Existing Condition:* Windows that are badly cracked, have broken or missing panes, or are inoperable need repaired or replaced.

b. *Materials:* Like materials should be used whenever possible. Energy Star rated windows are highly recommended. Vinyl double pane windows with low e-glazing are recommended when like materials are not possible or not practical.

c. *Installation or Repair:*
   1. Replace existing window units with new window units. These units should be installed according to manufacturer's instructions.
   2. Replace existing window sash and track with replacement window sash and track. These units should be installed according to manufacturer's instructions.
   3. Install new (secondary) vinyl window unit within existing window frame. These units should be installed according to manufacturer's instructions.
   4. Install replacement sills. If the sill has become rotted, but the window unit does not need replacing; Use sheet metal material as a cap over the existing seal to function as flashing.

2. Storm Windows and Window Screens.

a. *Existing Condition:* Lack of storm windows or window screens, or damaged and inoperable storm windows and window screens.

b. *Materials:* Wood or Aluminum storm windows sized to fit window opening. If available, elements may be replaced if damaged with exact matching storm windows or window screens.

c. *Installation or Repairs:* Storm windows should be installed according to manufacturer's instructions.

3. Exterior Doors.

a. *Existing Condition:* Damaged, inoperable, unsecured, or non-weather-tight doors.

b. *Materials:* Wood, insulated steel, or insulated aluminum doors.

c. *Installation or Repair:*
   1. Repair existing door with like materials.
   2. Replace existing door with new door only.
   3. Replace existing door with secondary door frame and door. Steel frames, due to their strength and size are recommended.
   4. Replace existing door with a new pre-hung door. Exterior doors are readily available pre-hung. These units should be installed according to manufacturers instructions.

4. Storm/Screen Doors.

a. *Existing Condition:* Doors that are inoperable, have broken glass, or have tears in the screen.

b. *Materials:* The storm door should be made of wood, vinyl, aluminum, or aluminum clad but aluminum or aluminum clad are recommended.

c. *Installation or Repair:* The doors should be installed according to manufacturer's directions.

5. Interior Doors.

a. *Existing Condition:* Damaged, missing, or inoperable doors.

b. *Materials:* Wood, solid core, hollow core, or wood composite doors may be used. Solid wood or solid core doors are recommended.

c. *Installation or Repair:* The doors should be installed according to manufacturer's directions.

Ventilation Standards

A. Minimum Ventilation Standards

1. *Conditions:* All habitable rooms shall be provided with natural or mechanical ventilation.

2. *Materials:* Exhaust fans, louvers, windows, and doors.

3. *Installation:* Louvers, windows and doors shall be able to let air pass freely between the room and the outdoors. The area of the natural ventilation should be at least four percent of the square footage of the room. [1] Adjoining should also be considered in the square footage of the room calculation. Exhaust fans must terminate outdoors and not in the attic. Excessive amounts of exhaust ductwork shall be avoided.
   The whole building shall either be capable of producing 0.35 air changes per hour or, if whole house mechanical ventilation is used, 15 cubic feet per minute (cfm) per occupant (assuming two occupants for the first bedroom and one occupant for each additional bedroom). [2]

Bathrooms

1. *Conditions:* Bathrooms, water closet compartments and other similar rooms shall be ventilated (using these provisions).

2. *Materials:* Windows and exhaust fans.

3. *Installation:* Windows must have at least 1.5 square feet of area that air can pass through if mechanical ventilation is not available. Both natural and mechanical ventilation shall be able to ventilate 50 cfm for non-continuous ventilation or 20 cfm for continuous ventilation. Ventilated air shall be exhausted directly outside and not terminate in any other part of the building. Excessive amounts of exhaust ductwork shall be avoided.

B. Clothes dryers exhaust

General

1. *Conditions:* Dryer exhaust systems shall be independent of all other systems, shall convey the moisture to the outdoors and shall terminate on the outside of the building. Screens shall not be installed at the duct termination. Transition ducts shall not be concealed within construction. [3]

2. *Materials:* Sheet metal screws, backdraft dampener, at least 0.016 inch thick rigid ducts, and flexible ducts (not recommended).

3. *Installation:* Exhaust ducts shall be connected with sheet-metal screws or fastening means which extend into the duct. Exhaust ducts shall be equipped with a backdraft damper. Exhaust ducts shall be constructed of minimum 0.016 inch thick rigid metal ducts, having smooth interior surfaces with joints running in the direction of the air flow. Flexible transition ducts used to connect the dryer to the exhaust duct system shall be limited to single lengths, not to exceed eight feet in length. Exhaust duct

terminations shall be in accordance with the dryer manufacturer's installation instructions.

Lint collector

1. *Conditions:* All ducts expelling lint shall be provided with a lint collector unless the dryer is already equipped with one. [4]

2. *Materials:* Lint collector.

3. *Installation:* Lint collectors shall be installed according to manufacturer's instructions.

Exhaust duct size

1. *Conditions:* The minimum diameter of the exhaust duct shall be as recommended by the manufacturer and shall be at least the diameter of the appliance outlet. [5]

2. *Materials:* At least 0.016 inch thick rigid ducts and flexible ducts (not recommended).

3. *Installation:* Duct sizes shall comply with the manufacturer's instructions.

Exhaust clearance

1. *Conditions:* Exhaust ducts for clothes dryers shall have a clearance of at least six inches from combustible materials.

2. *Materials:* Gypsum board, at least 0.016 inch thick rigid ducts and flexible ducts (not recommended).

3. *Installation:* If such a duct passes through a wall, floor, or partition constructed of combustible material, all such material in the wall, floor or partition shall be cut away from the duct for a sufficient distance to provide a clearance of at least six inches and the opening shall be closed in accordance with noncombustible material. [6]

Length limitation

1. *Conditions:* The maximum length of a clothes dryer exhaust duct shall not exceed 25 feet from the dryer location to the wall or roof termination. The maximum length of the duct shall be reduced by 2.5 feet for each 45 degree turn and five feet for each 90 degree turn. The maximum length of the exhaust duct does not include the transition duct.

2. *Materials:* At least 0.016 inch thick rigid ducts and flexible ducts (not recommended).

3. *Installation:* The dryer exhaust duct shall be installed according to the conditions stated above. However, if the manufacturer's installation instructions for such dryer are provided to the building official, the maximum length of exhaust duct, including any transition duct, shall comply with the manufacturer's installation instructions. [7]

Multiple installations

1. *Conditions:* Multiple installations of clothes dryers shall be made in a manner to prevent adverse operation due to depressurization that might be created in the exhaust.

2. *Materials:*

3. *Installation:* Common exhaust vents that pass through floors of buildings requiring the protection of vertical openings shall be enclosed with approved walls having a fire resistance rating of not less than one hour where such chimneys are located in a building less than four stories in height, and not less than two hours where such chimneys are located in a building four or more stories in height. [8]

C. Range Hoods. [9]

1. Conditions: Range hoods shall discharge to the outdoors through a single wall duct. The duct serving the hood shall be air tight and shall be equipped with a backdraft damper. Ducts serving range hoods shall be constructed of galvanized steel or stainless steel and not terminate in an attic or crawl space or areas inside the building.

2. Materials: Range hood, backdraft dampener, galvanized and stainless steel ducts.

3. Installation: Range hoods shall be installed according to the conditions stated above. Variations can be made where installed in accordance with the manufacturer's installation instructions, and where mechanical or natural ventilation is otherwise provided.

D. Overhead exhaust hoods. [10]

1. *Conditions:* Overhead exhaust hoods shall discharge to the outdoors and shall be equipped with a backdraft damper. Broiler units incorporating an integral exhaust system, and listed and labeled for use without an exhaust hood, need not be provided with an exhaust hood. [11]

2. *Materials:* At least 28 gauge metal, backdraft dampener.

3. *Installation:* Domestic open-top broiler units shall be provided with a metal exhaust hood, not less than 28 gauge, with a clearance of not less than 0.25 inch between the hood and the underside of combustible material or cabinets. A clearance of at least 24 inches shall be maintained between the cooking surface and the combustible material or cabinet.[12] The hood shall be at least as wide as the broiler unit and shall extend over the entire unit and be centered over the unit [13]

E. Exhaust Ducts. [14]

1. *Conditions:* Where exhaust duct construction is not specified in this chapter, exhaust ducts shall be a continuous system and free from duct tape.

2. *Materials:* Galvanized or stainless steel ducts, mastic.

3. *Installation or Repairs:* The exhaust ducts shall be tightly sealed so that the exhaust air is exhausted outdoors. Gaps, spaces, and holes in exhaust ducts should be repaired and/or sealed. Duct tape shall not be used as a means of sealing or repairing ducts. Mesh sealants such as mastic should be used to replace any duct tape and to seal exhaust ducts.

---

[1] IRC 2000, Section R303.1 & UCBC 1997, Section 701.3
[2] IRC 2000, Section R303
[3] IRC 2000, Section M1501
[4] NFPA 211 2000, Section 7-7.3.1
[5] IRC 2000, Section M1501
[6] NFPA 211 2000, Section 7-7.3.8 & Section 7-7.3.9
[7] IRC 2000, Section M1501
[8] NFPA 211 2000, Section 7-7.3.10
[9] IRC 2000, Section M1502
[10] IRC 2000, Section M1504
[11] IRC 2000, Section M1504
[12] NFPA 211 2000, Section 7-7.2.4.6
[13] NFPA 211 2000, Section 7-7.2.4.5
[14] IRC 2000, Section M1505

Stairs Standards

A. Stairs

Minimum Performance

1. *Conditions:* Any wood members that break into clumps of dark brown, black, or grey instead of splintering when picked at with a sharp object, are exhibiting signs of decay and must be replaced or reinforced. Also, if the wood makes a dull, hollow sound when it is rapped upon the wood beneath the surface may also be decayed. [1]

2. *Materials:* Dimensional lumber, engineered lumber, and epoxy adhesive.

3. *Repairs:* If repair is required due to decay, the source of the moisture causing the decay must also be repaired.

Physical conditions

1. *Conditions:* The largest tread run within any flight of stairs shall not exceed the smallest by more than 3/8 inch. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch.[2]

2. *Materials:*

3. *Installation:*

Illumination

1. *Conditions:* All exterior and interior stairways shall be provided with illumination of the stairs, landings, and treads. Each interior stairway shall have an artificial light source over each landing of the stairway. Exterior stairways shall have an artificial light source located in the immediate vicinity of the top landing of the stairway. Exterior stairways providing access to a basement from the outside grade level shall have an artificial light source in the immediate vicinity of the bottom landing of the stairway. Artificial light is not required at both top and bottom landings if lighting is provided over each stairway section.[3]

2. *Materials:* Lighting fixtures and switches.

3. *Installation:* The control for the illumination of interior stairways shall be accessible at both the top and bottom of the stairway without traversing any step of the stairway. The control for the illumination of exterior stairways shall be located inside the dwelling unit. Lights that are continuously illuminated or automatically activated are exempt from the control standards. [4]

B. Handrails and Guardrails

Handrails

1. *Conditions:* All stairways having four or more risers shall have at least one handrail. Spiral and winding stairways shall have a handrail on the outside perimeter.

2. *Materials:* Handrails.

3. *Installation:* The handrails should have a height of no less than 34 inches and no more than 38 inches, and should be in good repair.[5] Handrails shall be strongly fastened to the floor and/or wall to support loads applied by people using the rails.[6]

Guardrails

1. *Conditions:* All unenclosed floor and roof openings, open and glazed sides of stairways, landings and ramps, balconies or porches that are more than 30 inches above grade or floor below, and roofs used for other than service of the building shall be protected by a guardrail. The following locations are exceptions: On the loading side of loading docks, on the auditorium side of a stage or enclosed platform.[7] Guardrails shall be strongly fastened to the floor and/or wall to support loads applied by people using the rails.[8]

2. *Materials:* Guardrails.

3. *Installation or Repairs:* Guardrails shall be at least 36 inches in height. Existing guardrails lower than 36 inches shall be increased or corrected to raise their height to 36 inches.[9]

---

[1] The Rehab Guide Volume 5: Partitions, Ceilings, Floors & Stairs, pg 16
[2] UCBC 1997, 405.1.1
[3] IRC 2000, 315.1
[4] IRC 2000, 315.1
[5] UCBC 1997, 405.1.2 & IRC 2000, 315.1
[6] Residential Rehabilitation Inspection Guide, pg 32
[7] UCBC 1997, 405.2
[8] Residential Rehabilitation Inspection Guide, pg 32
[9] UCBC 1997, 405.2

Residents with Special Needs

1. General. Some dwelling units may have occupants with special needs. It is recommended to install devices that facilitate persons with mobility impairments, back restraints, reduced strength, joint conditions, or elderly persons. It is highly recommended to install these devices in dwellings that serve people with special needs. These are recommendations for special needs occupants and are not required unless specifically stated in this document, or unless a governing authority requires it. If they are already in place, they should be in good condition and be repaired or replaced if not in good condition.

2. Entrances.

a. *Lighting.* Lighting should reach the door lock and handle.
b. *Porch Landing.* The suggested landing size is 5-feet by 5-feet, even though a 3-foot by 3-foot is what is required by the IRC. The landing should be raised to door level when possible, and have positive slope away from the building.
c. *Ramps.* Ramps should be in good repair. They should not have a slope of more than one unit vertical in eight units horizontal (12.5-percent slope). There should be provided handrails on at least on side of the ramp. A minimum 3-foot by 3-foot (914 mm by 914 mm) landing shall be provided at the top and bottom of the ramp, where doors open onto ramps, and where ramps change direction.[1]
d. *Doors.* A lever or loop handle works best for all persons. The threshold should have a maximum height of ½ inch.

C. Kitchens.

a. *Sinks*. Lever handles are easiest to use. It is suggested that any new sinks that are installed have a shallow basin and a drain to the rear in homes with people of special needs. [2]
b. *Stoves.* When installing new stoves, self-cleaning with front-mounted controls are the easiest accessible.[3]
c. *Refrigerator.* New refrigerators should be side-by-side or one with a freezer on the bottom.[4]

D. Bathrooms.

a. *Blocking for a grab bar.* When the finished wall of a bathroom is being removed, blocking for grab bars should be installed in those dwellings of the aforementioned population. The blocking should be located 33-36 inches above the floor and it is suggested that the bars be 42 inches in length whenever possible. Locations for the blocking include all walls of the shower/bathtub and the sidewall of the toilet and it is suggested the rear wall of the toilet as well. If the finished wall is not being removed, it is suggested that grab bars be installed for those in need anyway.[5]
b. *Toilet seat height.* It is recommended to increase the toilet seat height with special thick seats or spacers that fit between the rim of the bowl and the seat.[6]
c. *Built in shower seat.* A permanent shower seat is recommended for those who need it when there is room to do so. The seat should have a depth of 15 inches, a height of 18 inches, should slope away from the wall at ¼ inch per foot, and should be able to bear a load of 300lbs.[7]

---

[1] International Residential Code Section R313
[2] Residential Remodeling and Universal Design
[3] Ibid
[4] Ibid
[5] HUD Rehab Guide Volume 6 Sections 7.3 and 8.3
[6] HUD Rehab Guide Volume 6 Section 8.3
[7] HUD Rehab Guide Volume 6 Section 7.3

Site Conditions

1. Site Drainage.

a. *Existing Condition:* "All roofs, paved areas, yards, courts and courtyards shall be drained into a separate storm sewer system, or into a combined sewer system where a separate storm sewer system is not available, or to some other place of disposal satisfactory to the Administrative Authority."[1]

b. *Materials:*

c. *Installation or Repair:* Wherever possible, the land should grade away from the house to promote good site drainage. It should, however, not allow drainage into a neighboring building or to an accessory building on the same lot. Good drainage should be provided under the basement window areas. It should be kept clean and well drained with a gravel pit that extends down to the foundation drain or leads via a drainpipe to a separate gravel (French) drain.[2]

2. Concrete and Masonry.

a. *Existing Condition:* Cracks in concrete and masonry walkways, paths, porches, driveways, etc. more than ¼ inch wide and change in elevation more than ½ inch tall shall be corrected.

b. *Materials:* Minor cracks may be repaired by mortar. Major cracks (those 1/8 inch and larger) should be repaired with concrete epoxy grout.

c. *Installation or Repair:* Should be installed according to manufacturer's directions.

3. Accessory Buildings.

a. *Existing Condition:* Leaking roofs; a defective failing electrical system; broken windows; flaking or peeling paint; insects, vermin, and rodent infestation shall all be corrected.

b. *Materials:*

c. *Installation or Repairs:*

4. Trees and Shrubs.

a. *Existing Condition:* Landscaping shall not pose any safe or health hazard.

b. *Materials:*

c. *Installation or Repairs:*
   1. Landscaping shall not constitute any foundation or roof.
   2. Branches shall not be in contact with the roof.
   3. Trees shall not be allowed to grow near the foundation causing a potential drainage and/or structural problem.
   4. Excessive bushes and trees shall not cause health or safety hazards (overgrown areas).
   5. Dead branches and/or trees, which pose a hazard of falling and causing personal harm or property damage, shall be removed.
   6. It is recommended to plant tall, full trees on the South side of the building to block summer sun. Short shrubs planted on the east and west side to block the rising and setting sun.

[1] Uniform Plumbing Code Section 1101.1
[2] Rehab Guides Volume 1 Section 3

Roofs

1. **Sheathing.**

   a. *Existying Condition*: Sheathing that is sagging, buckling, or rotted must be replaced. Visual signs of deterioration include obvious delamination or deterioration, the existence of water stains, dark patches, mold spores, insect holes and charring of the sheathing and roof structure.

   b. *Materials*: 1" by 12" pine sheeting grade exterior plywood, or ½" press wood sheeting.

   c. *Installation or Repair*: A minimum of 8d common nails should be spaced a maximum of 6 inches on center at supported panel ends and edges. At intermediate supports, fasten panels 12 inches on center.

2. **Underlayment & Moisture Barrier.**

   a. *Existing Condition*: Where shingles or sheathing need replaced or repaired, underlayment and moisture barrier need to be replaced.

   b. *Materials*: Minimum 15 lb. black felt paper

   c. *Installation or Repair*: The felt paper must be rolled and stapled. Successive sheets shall be overlapped 2 inches, and fastened sufficiently.

3. **Shingles.**

   a. *Existing Condition*: Shingles must be removed if one of the following exists: curling, rounded, buckling, or deterioration.

   b. *Materials*: Shingles shall either be asphalt or fiberglass, (new, not seconds). The shingles should carry a minimum 30-year warranty. Three dimensional/architectural shingles are not allowed. Installation of aluminum roof edging and starter strips; metal flashing shall be sued wherever the roof abuts a wall, over, vents, around other extensions through the roof and around masonry chimneys.

   c. *Installation or Repair*: Shingles shall be installed using a minimum ¾" roofing nail and have four nails for a three tab shingle or should be installed according to the manufactures directions.

4. **Flashing.**

   a. *Existing Condition*: Damaged or deteriorated flashing must be replaced.

   b. *Materials*: Flashing should be replaced with materials comparable to the existing materials. Appropriate types include: copper, aluminum, galvanized steel, stainless steel, or rheinzink flashing. Roll roof flashing may be installed in some roof valleys.

   c. *Installation or Repair*: Should be installed according to manufacturer's directions.

5. **Gutters & Downspouts.**

   a. *Existing Condition*: Missing, sagging, or deteriorated must be replaced.

   b. *Materials*: Acceptable replacement materials include: steel, aluminum, copper or vinyl. Wood is only acceptable if required by Department of Natural Resources – Division of Historic Preservation & Archeology. Downspouts shall be color coordinated with gutters and shall be 2" X 3".

c. *Installation or Repair*: Gutters shall be supported at least every three feet with spikes and ferrules or wrap-around strap hangers. Downspouts shall be securely attached to house and connected to exterior drainage system if one exists or installed in such a manner that storm water will drain away from the house and not result in washing, erosion, or damage to the foundation of the house. If there is no drainage system present, splash blocks need to be present.

Plumbing

1. Water Distribution System.

a. *Condition:* Leaking drain or supply lines shall be the presence of lead piping, failed polybutylene joints or pipes, low water pressure, or corroded or broken pipes repaired or replaced. Any cross connections or siphonage between fixtures shall be corrected.

b. *Materials:* It is best to use similar materials whenever possible. It is not acceptable to use materials of a different type that could corrode through electrogalvanic action, e.g., brass and iron fittings joined.[1]
   1. The following plumbing materials and supplies shall not be used:
      a. All-purpose solvent cement, unless listed for the specific application;
      b. Flexible traps and tailpieces, unless listed for the specific application; and
      c. Solder having more than 0.2 percent lead in the repair of potable water systems.[2]
   2. The following is a list of materials that are acceptable for rehabilitation projects.
      a. Copper piping,
      b. Brass piping,
      c. Chlorinated polyvinyl chloride piping (CPVC),
      d. Cross-linked polyethylene piping (PEX),
      e. Other plastic piping such as ABS, PVC, and PE.

c. *Installation or Repair:*
   1. There shall be a properly operating main shut-off valve on the house side of the meter. The shut-off valve should be checked to make sure that it is not frozen into the open position.
   2. Replacement sillcocks shall be freeze-proof and have a shut-off valve. If a plumbing fixture, which lacks a functioning shut-off valve, is repaired or replaced, a shut-off valve shall be installed.[3]

2. Drain, Waste, and Vent System.

a. *Condition:* Leaks; clogged, slow, or non-working drains; or odors.[4] Any cross connections or siphonage between fixtures shall be corrected Supplies that are located below the overflow drain must be corrected

b. *Materials:* All additions, repairs, etc. shall use materials that conform to the Uniform Plumbing Code. Existing piping may remain so long as it is in good working order.

c. *Installation or Repairs:*
   1. Horizontal drainage piping shall be installed in uniform alignment at uniform slopes.
   2. The size of drainage pipe shall not be reduced in size in the direction of flow. A 4-inch by 3-inch water closet connection shall not be considered a reduction in size.
   3. Drainage piping for future fixtures shall terminate with an approved cap or plug.
   4. In the installation or removal of any part of a drainage system, dead ends shall be prohibited. Cleanout extensions and approved future fixture drainage piping shall not be considered as dead ends.[5]

3. Hot Water Supply System.

a. *Condition:* Each dwelling unit shall have a hot water heater located, equipped, and installed in accordance to the Uniform Plumbing Code. Hot water (water at a temperature of 110^{o}F or above) shall be provided to any area where the following activities take place: bathing, washing, culinary purposes, cleansing, laundry, or building maintenance.

b. *Materials:* A water heater that has been properly inspected and approved.

c. *Installation:* New water heaters shall be installed to manufacturer's instructions.

4. Fixtures and Faucets.

a. *Condition:*

1. Kitchen Sink.
   Any sink rusted, severely chipped or with badly worn enamel shall be replaced.
   When a garbage disposal is installed, the drain line to the vent stack shall be routed out or replaced.
2. Lavatory Sink.
   A rusted, severely chipped or with badly worn enamel lavatory sink shall be replaced
   The lavatory sink may be located in the same room as the flush water closet, or, if located in another room, it shall be in close proximity to the water closet compartment.
3. Bathtub/Showers.
   A rusted bathtub and/or shower unit or one that is chipped or has badly worn enamel shall be replaced.
4. Flush Water Closet.
   The water closet shall be equipped with an easily cleanable surface. All water closets, existing or newly installed, shall have a functioning shut-off valve.

b. *Materials:* All new installations must follow the 1992 National Plumbing Standards, which mandates the use of water-conserving toilets, showerheads, and faucets.

c. *Installation:* All installations should follow manufacturer's specifications.

[1] HUD Rehab Guide Volume 8 Section 13
[2] International Residential Code Section AJ301
[3] Existing IHFA Rehab Standards
[4] HUD Rehab Guide Volume 8 Section 13
[5] International Plumbing Code Section 704

Partition Standards

A. Wall Coverings.

1. *Condition:* All wall coverings shall be securely fastened to the wall assembly. Wall coverings shall be free from loose material, gouges, holes, and cracks greater than $^{1}/_{16}$ of an inch.[1]

2. *Materials:* Existing plaster, gypsum board, or other wall covering materials.

3. *Installation or Repairs:* Wall coverings should be installed according to manufacturer's instructions. In situations where the gypsum board suffered from 'nail pops', shorter fasteners work better than long fasteners to help avoid nail pops.

B. Wall Finishes.

1. *Condition:* Peeling and flaking paint and loose or torn wallpaper shall be repaired or replaced to properly cover the wall surface.[2]

2. *Materials:* Paint (preferably low to 0 V.O.C.) and wallpaper.

3. *Installation:* Paint should be applied evenly and over the entire surface of the wall covering it is being used as a finish for. Wallpaper should be applied according to manufacturer's instructions.

B. Excessive Notching and Drilling.

1. *Conditions:* Any bearing stud may be cut or notched to a depth no more than 25 percent of its width. Nonbearing studs may be notched no more than 40 percent of a stud width. Any stud may be drilled or bored as long as the diameter of the hole is no greater than 40 percent of the stud width. The edge of the stud and the hole cannot be located in the same section as a cut or notch.

2. *Materials:* Dimensional lumber

3. *Installation:*

C. Fireblocking

1. *Conditions:* Fireblocking shall be provided to cut off all concealed draft openings and to form an effective fire barrier between stories, the top story and the roof space.[3]

2. *Materials:* Two inch lumber, or two thicknesses of one inch lumber with broken lap joints, or one thickness of $^{23}/_{32}$ inch wood structural panels with joints backed by $^{23}/_{32}$ inch wood structural panels, or one thickness of $^{3}/_{4}$ inch particleboard with joints backed by $^{3}/_{4}$ inch particleboard, $^{1}/_{2}$ inch gypsum board, or $^{1}/_{4}$ inch cement-based millboard.[4] Fire Caulk shall be used to fill smaller holes and gaps that rigid materials cannot.

3. *Installation:* Fireblocking shall be provided in wood frame construction in the following locations:

a. In concealed spaces of stud walls and partitions, including furred spaces, at the ceilings and floor level and at 10 foot intervals both vertically and horizontally. Fire Caulk shall be allowed as fireblocking in walls constructed using parallel rows of studs or staggered studs.
b. At all interconnections between concealed vertical and horizontal spaces such as soffits, drop ceilings, and cove ceilings.
c. In concealed spaces between stair stringers at the top and bottom of the run. Enclosed accessible space under stairs shall have walls, under stair surface and any soffits protected on the enclosed side with $^{1}/_{2}$ inch gypsum board.
d. At openings around vents, pipes, and ducts at ceilings and floor level. [5]
e. All spaces between chimneys and floors and ceilings through which chimneys pass shall be fireblocked with noncombustible material securely fastened in place. The fireblocking of spaces between chimneys and wood joists, beams, or headers shall be to a depth of one inch and shall only be placed on strips of metal lath laid across the space between the combustible material and the chimney.
f. Fireblocking of cornices of a two-family dwelling is required at the line of dwelling unit separation. [6]

D. Bathrooms and Kitchens. [7]

1. *Conditions:* Shower compartment walls shall be furnished with a hard and smooth, non-absorbent surface. Wall surfaces shall be free from mildew.

2. *Materials:* Hard, smooth, and non-absorbent shower compartment, mildew resistant paint.

3. *Installation:* The hard, smooth, non-absorbent surface shall have a height of at least six feet from the floor. Paint shall be applied in an even and tidy manner. If mildew is present, measures shall be taken to prevent future mildew as well as removing the current mildew.

---

[1] IHFA Rehabilitation Standards 1993, Section 4-1
[2] IHFA Rehabilitation Standards 1993, Section 4-1
[3] IRC 2000, R602.8
[4] IRC 2000, 602.8.1.2 (minus sub-sections R602.8.1.1 & R602.8.1.2) which get into detail about fiberglass batts
[5] IRC 2000, R314.8
[6] IRC 2000, R1001.16
[7] IHFA Rehabilitation Standards 1993, Section 4-1

HVAC Standards

A. Controls

1. *Conditions:* Thermostatic controls must comply to the following conditions:
    a. Each thermostat shall be functional. The spring coil shall be free of dust and all electrical contacts shall be clean and free of corrosion.
    b. Each gas and oil combustion system shall have a master switch that serves as an emergency shutoff for the burner on that system. The switch shall be easily accessible in case an emergency shutoff is necessary.[1]

2. *Materials:*

3. *Installation:*

B. Fuel Supply

Piping

1. *Conditions:* Piping shall be properly supported, but not supported by other piping.[2] A sediment trap shall be located as close as practical to the inlet of each combustion appliance (illuminating appliances, ranges, dryers, and outdoor grills need not be equipped).[3] Shutoff valves shall have easy access and be protected from damage.[4]

2. *Materials:* Black iron or steel pipe,[5] pipe hooks, metal pipe straps, bands, brackets, or hangers,[6] and valves.[7]

3. *Installation:* Piping shall be supported with appropriate hangers for the size of pipe. Supports shall be at such an interval and strength to prevent or dampen excessive vibration. Pipe supports shall be installed so they will not be detached by movement of the pipe being supported.[8] An acceptable sediment trap may consist of a capped nipple in the bottom opening of the run of the tee.[9] The sediment trap nipple shall be at least three inches in length.[10] Each appliance shall have a shutoff valve, separate from other appliances and located in the same room as the appliance. Shutoff valves shall be located within six feet and upstream from the appliance (exceptions may be made for vented decorative appliances, shutoff valves may be installed in a remote room). [11]

Indoor Oil Tanks

1. *Conditions:* The oil tank shall be in good, functioning condition. The oil tanks must be of a size and shape that can be removed from the building as a whole unit.[12] No more than 550 gallons of fuel oil shall be stored inside the building. The oil gauge must be functional. The fuel supply line to the furnace shall be equipped with a filter. [13]

2. *Materials:* Oil tank, oil gauge (not glass gauges), filter, and supports.

3. *Installation or Repair:* Oil tanks shall be installed according to manufacturer's instructions. Oil tanks shall also be installed on rigid, noncombustible supports.

Oil tanks must be at least five feet from the nearest fire, flame, or combustion appliance.[14] Broken or non-functioning oil gauges shall be replaced according to manufacturer's instructions. The tanks must be tested for leaks and corrosion along the bottom of the tank where the leaks would occur. The fuel filter shall be installed so that it is protected from accidental damage and rupture and according to manufacturer's instructions[15].

C. Combustion Heat (Forced Air Systems only)

Basic Conditions

1. *Conditions:* The unit must have at least three feet on each side for maintenance. The unit shall also be free from rust or other physical damage. The heat exchanger must be free from cracks or other openings.[16] Barometric draft regulators shall be located above the unit or on the smoke pipe in oil burning appliances.[17]

2. *Materials:*

3. *Installation or Repairs:* An initial visual check can be used to see any cracks or damage to the heat exchanger. If no damage is found, a monoxer or other device that can detect combustion products shall be used to verify no combustion products are escaping the heat exchanger.

Combustion Air (This tells how to basically perform a worst case draft test a.k.a. safety inspection of an existing appliance installation.)

1. Conditions: The combustion appliance zone (CAZ) must be able to pass a Worst Case Draft test indicating that there is enough combustion air.

2. Materials: Monoxer (carbon monoxide gauge), Manometer (digital or analog), or other draft gauge, or a small smoke source.

3. Installation: How to test the safety of an installed combustion appliance (Worst Case Draft test):
   a. "Insofar as practical, close all building doors and windows and all doors between the space in which the appliance is located and other spaces of the building. Turn on clothes dryers. Turn on any exhaust fans, such as range hoods, and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers."
   b. "Place the appliance being inspected in operation."
   c. "Test for spillage at the draft hood relief opening after five minutes of operation. Use a flame of a match or candle or smoke from a cigarette, cigar, or pipe."
   d. "Turn on all other fuel-gas burning appliances within the same room so they will operate at their full inputs."
   e. "Repeat step c on each appliance being inspected."[18]

Vents

General Conditions

1. *Conditions:* Vents shall be sized to properly exhaust all combustion products. Vents shall also consist of the appropriate vent type for the combustion appliance(s) being vented. Vents shall be free from damage or rust and be tightly connected.

2. *Materials:* Type B or L vents, approved fasteners

3. *Installation or Repairs:* Vents shall be properly supported so that they are vertical and comply with the listed clearance to combustible materials of the vent.

Vent Termination

1. *Conditions:* The following conditions must be met for vent terminations:[19]
   a. The vent must extend at least three feet from where it passes through the roof and at least two feet higher than any ridge, wall, or parapet within a horizontal distance of 10 feet from the termination.
   b. When the vent termination is more than 10 feet from the nearest ridge, wall, or parapet it must extend at least three feet from where it passes through the roof.
   c. The vent must extend at least five feet above the highest connected drafthood outlet.

2. *Materials:* Type B or L vents, approved fasteners.

3. *Installation:*

Vent Connectors

1. Conditions: Vent connectors shall be sized to properly vent combustion products. Vents shall also consist of the appropriate vent type for the combustion appliance(s) being vented. Vents shall be free from damage or rust and be tightly connected. All segments of vent connectors shall be accessible at all times.

2. Materials: Type B or L vents, approved fasteners.

3. Installation: Vent connectors shall be properly supported and have a minimum slope of $^1/_4$ inch per foot and comply with the listed clearance to combustible materials of the vent.

D. Electric Heat

Observable heat source

1. *Conditions:* All heating elements shall be functional. Heating units shall also be in good condition.

2. *Materials:* Heating elements

3. *Installation or Repairs:* Any heating element that does not heat up shall be checked to make sure the connections to the element are good and that the relay is not malfunctioning. If the connections are good and the relay is properly functioning the element should be replaced. Any bent fins on baseboard heaters shall be combed to straighten them.[20] The auxiliary heater in heat pumps shall also be checked to verify that it functions properly.[21]

Unobservable heat source

1. *Conditions:* All heating elements shall be functional. Heating units shall also be in good condition.

2. *Materials:* Heating elements

3. *Installation or Repairs:* If heat is called for and the hidden elements give off no heat the circuitry shall be checked before uncovering the heating elements. If the circuitry is functioning normally, the hidden heating elements should be uncovered and repaired or replaced.[22]

*** If any heating unit is replaced, it is *strongly* recommended that Energy Star Heating Systems be used. Sealed combustion furnaces are also recommended if a natural gas furnace must be replaced.**

E. Cooling

1. *Conditions:* Central air conditioners shall be in good, working condition. Unit/Window air conditioners shall have a tight seal around the unit and be properly supported. Unit/Window air conditioners shall also be properly grounded.[23] If a heat pump is equipped with a reversing valve, it shall be properly functioning.[24]

2. *Materials:* Air conditioner units

3. *Installation or Repairs:* Bent fins on air conditioners should be combed to straighten them. The condensate shall be properly drained so that moisture problems are not created. Fiberglass shall not be used as an air sealant around window/unit air conditioners.

*** If any cooling unit is replaced, it is *strongly* recommended that Energy Star Cooling Systems be used.**

F. Distribution Systems

1. *Conditions:* The following conditions shall be followed:
    a. Duct systems shall be in tact and well sealed.
    b. Air shall be allowed to freely flow from supply registers to return registers
    c. When furnaces are converted from a gravity fed heating system to a forced air system supply registers shall be moved to the outer walls of the building.
    d. Duct tape shall not be used to seal or connect ducts.

2. *Materials:* Metal ducts, mastic, grills, and louvers.

3. *Installation or Repairs:* When possible, supply and return registers shall be located in the same room. If supplies and returns cannot be in the same room, measures must be taken to allow for air to flow from supplies to a return even if doors are closed separating the rooms. Grills and louvers are two methods of allowing air to flow from room to room. Whenever ducts need to be sealed they should be sealed with a sealant such as mastic.

---

[1] Residential Rehabilitation Inspection Guide 2000, pg 82
[2] IRC 2000, Section G2417
[3] IRC 2000, Section G2418
[4] IRC 2000, Section G2419
[5] Residential Rehabilitation Inspection Guide 2000, pg 84
[6] IRC 2000, Section G2417
[7] IRC 2000, Section G2419
[8] IRC 2000, Section G2417
[9] IRC 2000, Section G2418
[10] National Fuel Gas Code 1999, Section 5.5.7
[11] IRC 2000, Section G2419
[12] IRC 2000, Section M2201
[13] Residential Rehabilitation Inspection Guide 2000, pg. 85
[14] IRC 2000, Section M2201
[15] Residential Rehabilitation Inspection Guide 2000, pg 85
[16] Residential Rehabilitation Inspection Guide 2000, pg 88
[17] Residential Rehabilitation Inspection Guide 2000, pg 87
[18] National Fuel Gas Code 1999, Appendix H
[19] National Fuel Gas Code 1999, Section 7.5.2
[20] Residential Rehabilitation Inspection Guide 2000, pg 97
[21] Residential Rehabilitation Inspection Guide 2000, pg 100
[22] Residential Rehabilitation Inspection Guide 2000, pg 97
[23] Residential Rehabilitation Inspection Guide 2000, pg 103
[24] Residential Rehabilitation Inspection Guide 2000, pg 101

Hazardous Materials

A. Asbestos

1. *Conditions:* Asbestos is not always a health hazard. It becomes a hazard when the material becomes air-borne. If asbestos is present and still intact it does not necessarily need to be removed (abated). If asbestos is encountered and is still intact, but will not be affected by the rehabilitation it is best to leave it in place. However, if the asbestos is deteriorating it should be sealed (encapsulated) using a material such as mastic, or it should be removed.

   A certified professional may perform the inspection of asbestos and make the decision of which measures should be taken.

   Encapsulation can be performed by the homeowner, but the removal of asbestos must be performed by a qualified asbestos-abatement contractor. The State Health Department may be contacted if there are further questions regarding the treatment of asbestos.[1]

2. *Materials:* Insulation containing asbestos, mastic, and other materials specified by Health Department.

3. *Installation or Repairs:* Contact State Health Department for further instructions.

B. Carbon Monoxide

1. *Conditions:* If combustion appliances are used in the building, measures shall be taken to prevent spillage of combustion products (carbon monoxide specifically) or alert the occupants of carbon monoxide emissions. While detectors are designed for alarming at high carbon monoxide levels, they do not detect lower amounts of carbon monoxide that can be just as hazardous over long periods of time.

   The best way to protect against carbon monoxide hazards is to make sure the building successfully passes a Worst-Case Draft test. If the building passes the Worst-Case Draft test this verifies that the combustion appliances are properly drafting, even under the worst depressurization conditions.

   If combustion appliances are used in the building a Worst-Case Draft test shall be performed regardless if any combustion appliances, exhaust or ventilation systems were installed or repaired.

2. *Materials:* Manometer (digital or analog), draft gauge, Monoxer (carbon monoxide gauge).

3. *Installation or Repairs:* Necessary measures must be made so that the building passes the Worst-Case Draft test. Some options are mechanical ventilation, under-cutting doors, grills, and louvers. The following is the passing criteria for a Worst-Case Draft test:

Minimum Draft Requirements

Outdoor Air Temperature	Minimum Draft Pressure	
	" W. C.	Pascals
Above 80° F	-0.005	-1
Between 60° F and 80° F	-0.01	-2
Between 40° F and 60° F	-0.01	-3

Between 30° F and 40° F	-0.01	-4
Between 20° F and 30° F	-0.01	-4
Below 20° F	-0.02	-5

1" of Water Column = 249.1 Pascals

Important: All vent pressure measurements are taken with reference to (WRT) the Combustion Appliance Zone (CAZ).

C. Radon

1. *Conditions:* The EPA recommends that mitigation measures be taken when radon concentrations are four picocuries per liter of air and above. Long term testing is the most accurate way of measuring the annual radon concentration. However, the more common three to seven day tests are accurate enough to determine if there is a hazardous amount of radon present. While it is only recommended that the building be safe from radon, it is easy to prevent high radon levels, and the measures are doubly beneficial. The infiltration of radon gas can be prevented with the same measures that reduce air infiltration for energy conservation purposes. If the basement or crawl space is properly air sealed, the amount of radon gas that can infiltrate is reduced.[2]

2. *Materials:* Durable sealant, sub-slab ventilation system where necessary.

3. *Installation or Repairs:* Perform air-sealing measures in basements to reduce air infiltration, primarily sealing cracks in the foundation and the joint along the perimeter of the foundation where it meets the basement wall. This may reduce the amount of radon if marginally high amounts are present in the basement. If larger amounts of radon are present a sub-slab ventilation system may be used to further reduce radon levels. Sub-slab ventilation systems shall be installed according to manufacturer's instructions.

[1] Residential Rehabilitation Inspection Guide, pg 36
[2] Residential Rehabilitation Inspection Guide, pg 38

Floor Standards

A. Minimum Performance

1. *Conditions:* Any wood members that break into clumps of dark brown, black, or grey instead of splintering when picked at with a sharp object, are exhibiting signs of decay and must be replaced or reinforced. Also, if the wood makes a dull, hollow sound when it is rapped upon the wood beneath the surface may also be decayed. [1]

2. *Materials:* Dimensional lumber, engineered lumber, and epoxy adhesive.

3. *Repairs:* If repair is required due to decay, the source of the moisture causing the decay must also be repaired.

B. Wood Floor Standards [2]

General Requirements

1. *Conditions:* Floors shall not excessively sag or become springy when live loads are applied or from the rest of the building itself.

2. *Materials:* Dimensional lumber, engineered lumber, floor sheathing.

3. *Installation or Repairs:* Floor joists shall be repaired or replaced if nonconformity is due to decay. If nonconformity is due to excessive weight or not enough support, additional structural support shall be added to reinforce the floor. Floor joist shall also be checked to make sure the existing supports are sufficient. At least an inch and a half of the joist must be bearing if the support is wood. At least three inches must be bearing if the support is masonry or concrete.[3]

Design and construction (Moisture control)

1. *Conditions:* The following situations must use pressure preservatively treated wood instead of typical untreated lumber.
   a. All wood in contact with the ground that supports permanent structures intended for occupancy.
   b. Posts, poles, and columns in direct contact with the ground or embedded in concrete and are exposed to the weather. Unless, the post, pole, or column is supported by piers, or metal pedestals projecting at least one inch (25.4 mm) above the floor or finish grade and are separated by an approved impervious moisture barrier.
   c. Any wood joist or bottom of a wood structural floor that is closer than 18 inches (457 mm) or wood girder that is closer than 12 inches (305 mm) to exposed ground in a crawl space or unexcavated area located within the periphery of the building foundation.
   d. All sills or plates resting on concrete or masonry exterior walls that are less than eight inches (203 mm) from exposed ground.
   e. All sills and sleepers on a concrete or masonry slab, unless an impervious moisture barrier separates the sills and/or sleepers from the slab.
   f. The ends of wood girders penetrating exterior concrete or masonry walls that have a clearance of less than 0.5 inch (12.7 mm) on tops, sides, and ends.

g. Wood siding, sheathing, and wall framing on the exterior of a building having a clearance of less than six inches (152 mm) from the ground.
h. Wood structural members supporting moisture permeable floors exposed to the weather, such as concrete or masonry slabs, unless the wood members are separated from the floor by an impervious moisture barrier.
i. Wood furring strips or other wood framing members attached directly to the interior of exterior masonry walls or concrete walls below grade except where an approved vapor retarder is applied between the wall and the furring strips or framing members.

2. *Materials:* Pressure preservatively treated wood, fasteners (hot-dipped galvanized steel, stainless steel, silicon, bronze, or copper).

3. *Installation:*

Design and construction (Termite control)

1. *Conditions:* When protection from termites is called for the following standards shall apply.[4]

2. *Materials:* Heartwood of redwood and eastern red cedar.

3. *Installation:* The concentration, rate of application, and treatment method of the termiticide shall be consistent with and never less than the termiticide label. Field cut ends, notches, and drilled holes of preservatively treated wood shall be retreated in the field.

Joists under bearing partitions

1. *Conditions:* Joists under parallel bearing partitions shall be doubled or a beam of adequate size shall be provided to support the load.

2. *Materials:* Dimensional and engineered lumber.

3. *Installation:* Double joists that are separated to permit the installation of piping or vents shall be full depth solid blocked with lumber not less than two inches (51 mm) in nominal thickness spaced not more than four feet (1219 mm) on center. [5]

Drilling and notching (Dimensional lumber) (Figure R502.8)

1. *Conditions:* Notches in lumber joists, rafters, and beams shall not exceed one sixth of the depth of the member and shall not be longer than one third of the depth of the member. Notches shall not be located in the middle one third of the member. Notches at the end of the member shall not exceed one fourth the depth of the member. The tension side of members thicker than four inches shall only be notched at the ends. The diameter of holes bored or cut into members shall be less than one third the thickness of the member. Holes must be at least two inches from the top or bottom of the member. Holes must also be at least two inches from any notches.[6]

2. *Materials:* Dimensional lumber.

3. *Installation:*

Drilling and notching (Engineered wood products)

1. *Conditions:* Cuts, notches, and holes bored in trusses, laminated veneer lumber, glue laminated members or I-joists are not permitted unless the effects of such penetrations are specifically considered in the design of the member.[7]

2. *Materials:* Engineered wood products.

3. *Installation:*

Lateral restraint at supports

1. *Conditions:* Joists shall be supported laterally at the ends.

2. *Materials:* Dimensional and engineered lumber.

3. *Installation:* Lateral support shall be provided by full-depth solid blocking not less than two inches (51 mm) nominal in thickness. Other acceptable means of joist lateral support are by attachment to a header, band, rim joist, or an adjoining stud, or some other approved means of lateral support to prevent rotation. Additionally, joists exceeding a two by twelve shall be laterally supported by solid blocking, diagonal bridging, or a continuous one inch by three inch (25.4 mm by 76 mm) strip nailed across the bottom of joists perpendicular to joists at intervals no more than eight feet (2438 mm). [8]

Framing of openings

1. *Conditions:* Openings in floor framing shall be framed with a header and trimmer joist.

2. *Materials:* Dimensional and engineered lumber, framing anchors, and ledger strips.

3. *Installation:* [9]

    a. When the header joist span does not exceed four feet (1219 mm), the header joist may be a single member the same size as the floor joist. Single trimmer joists may be used to carry a single header joist that is located within three feet (914 mm) of the trimmer joist bearing.
    b. When the header joist span exceeds four feet (1219 mm), the trimmer joists and the header joist shall be doubled and of sufficient cross section to support the floor joists framing into the header.
    c. Approved hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds six feet (1829 mm).
    d. Tail joists over 12 feet (3658 mm) long shall be supported at the header by framing anchors or on ledger strips not less than two inches by two inches (51 mm by 51 mm).

Draftstopping required

1. *Conditions:* Draftstops shall be installed when there is usable space above and below a floor/ceiling assembly. Installed draftstops shall limit the concealed space so that they are approximately equally divided and not more than 1000 square feet in area.
2. *Materials:* At least 0.5 inch (12.7 mm) gypsum board, 0.375 inch (9.5 mm) wood structural panels or Type 2-M-W particleboard.
3. *Installation:* Draftstopping shall be installed parallel to the floor framing members unless otherwise approved by the building official.[10]

Fireblocking

1. *Conditions:* Fireblocking shall be provided to cut off all concealed draft openings and to form an effective fire barrier between stories, the top story and the roof space.[11]

2. *Materials:* Two inch lumber, or two thicknesses of one inch lumber with broken lap joints, or one thickness of $^{23}/_{32}$ inch wood structural panels with joints backed by $^{23}/_{32}$ inch wood structural panels, or one thickness of $^{3}/_{4}$ inch particleboard with joints backed by $^{3}/_{4}$ inch particleboard, $^{1}/_{2}$ inch gypsum board, or $^{1}/_{4}$ inch cement-based millboard.[12] Fire Caulk shall be used to fill smaller holes and gaps that rigid materials cannot.

3. *Installation:* Fireblocking shall be provided in wood frame construction in the following locations:
   a. In concealed spaces of stud walls and partitions, including furred spaces, at the ceilings and floor level and at 10 foot intervals both vertically and horizontally. Fire Caulk shall be allowed as fireblocking in walls constructed using parallel rows of studs or staggered studs.
   b. At all interconnections between concealed vertical and horizontal spaces such as soffits, drop ceilings, and cove ceilings.
   c. In concealed spaces between stair stringers at the top and bottom of the run. Enclosed accessible space under stairs shall have walls, under stair surface and any soffits protected on the enclosed side with $^{1}/_{2}$ inch gypsum board.
   d. At openings around vents, pipes, and ducts at ceilings and floor level. [13]
   e. All spaces between chimneys and floors and ceilings through which chimneys pass shall be fireblocked with noncombustible material securely fastened in place. The fireblocking of spaces between chimneys and wood joists, beams, or headers shall be to a depth of one inch and shall only be placed on strips of metal lath laid across the space between the combustible material and the chimney.
   f. Fireblocking of cornices of a two-family dwelling is required at the line of dwelling unit separation. [14]

C. Floor Sheathing [15]

1. *Conditions:* Sheathing shall be in good condition.

2. *Materials:* Lumber, wood structural panel, and particleboard.

3. *Installation:* Sheathing shall be installed perpendicular or diagonal to floor joists. Joists and beams spaced less than 16 inches do not need sheathing if a one inch tongue and groove wood strip flooring is installed perpendicular to the joists.

E. Floor Finishes

1. *Conditions:* Unfinished floors shall have a varnish or paint coating.[16] Plywood or particleboard shall be covered with carpeting or other approved floor finishes. [17]

2. *Materials:* Varnish, paint, carpet, ceramic tile, vinyl sheets and tiles, linoleum.

3. *Installation:* Floor finishes shall be installed according to manufacturer's instructions.

F. Toilet, Bath, Shower, and Kitchen Spaces

1. *Conditions:* Bathtub and shower floors shall be finished with a nonabsorbent surface. [18] When a new floor finish is installed in the bathroom, both the plywood underlayment and the floor finish shall extend under the water closet. If a new vanity unit is to be installed, the underlayment and floor finish shall extend under the vanity unit. [19] When a new floor finish is installed in the kitchen, it shall extend under moveable appliances, including stoves and refrigerators. If cabinets are replaced, the floor finish shall extend under the cabinets. [20]

2. *Materials:* Ceramic tile, vinyl sheets and tiles, linoleum, and sheathing.

3. *Installation:* Floor finishes shall be installed according to manufacturer's instructions. Floor sheathing (underlayment) shall be installed according to the Sheathing provisions in this Section.

---

[1] The Rehab Guide Volume 5: Partitions, Ceilings, Floors & Stairs, pg 16
[2] IRC 2000, Section R502
[3] IRC 2000, Section R802.6
[4] IRC 2000, Section R324
[5] IRC 2000, R502.4
[6] IRC 2000, R502.8
[7] IRC 2000, R502.8.2
[8] IRC 2000, R502.7
[9] IRC 2000, R502.10
[10] IRC 2000, R502.12
[11] IRC 2000, R602.8
[12] IRC 2000, 602.8.1.2 (minus sub-sections R602.8.1.1 & R602.8.1.2) which get into detail about fiberglass batts
[13] IRC 2000, R314.8
[14] IRC 2000, R1001.16
[15] IRC 2000, R503.1
[16] IHFA rehab standards 1993, 4-3.3
[17] IHFA rehab standards 1993, 4-3.4
[18] IRC 2000, R307.2
[19] IHFA rehab standards 1993, 4-3.5d
[20] IHFA rehab standards 1993, 4-3.5c

Fire Safety

1. Means of Egress.

a. *Conditions:* All elements of the means of egress system shall be sufficient size, width, and arrangement to provide safe and adequate means of egress.

b. *Materials:*

c. *Installation:* Every required means of egress shall have access to a public way, directly or through yards, courts or similar spaces, and such access shall be permanently maintained clear of any obstruction that would impede egress.

2. Number of Means of Egress.

a. *Conditions:* Occupants of every floor above the first story and basements shall have access to at least two separate means of egress. When approved by the building official, one of the means of egress may be an exterior fire escape complying with [Section 9.5]. A fire escape shall not be substituted for a stairway that was required by the code under which the building was constructed. Exceptions:

1. In all occupancies, second stories with an occupant load of less than 10 may have one means of egress.
2. Floors and basement used exclusively for service of the building may have one means of egress. For the purposes of this exception, storage rooms, laundry rooms, maintenance offices and similar uses shall not be considered as providing service to the building.
3. Basements within an individual dwelling unit having an occupant load of less than 10 may have one means of egress.
4. Occupied roofs on Group R, Division 3 Occupancies may have one means of egress if such occupies areas are less than 500 square feet (46.45 m^2) located no higher than immediately above the second story. [1]

b. *Materials:*

c. *Installation:*

3. Corridors.

a. *Conditions:* Corridors serving as a part of the means of egress system that have an occupant load of 10 or more in a Group R, Division 1 shall have walls and ceilings of not less than one-hour fire-resistive construction.

b. *Materials:*

c. *Installation:* Existing walls and ceilings surfaced with wood lath and plaster or ½-inch-thick (12.7 mm) gypsum wallboard may be permitted in lieu of one-hour fire-resistive construction, provided the surfaces are in good condition.

Door openings into such corridors shall be protected by a tightfitting smoke- and draft-control assembly having a fire-protection rating of not less than 20 minutes when such opening protection was required by the code under which the building was constructed shall be maintained. When the building was constructed under a code that did not require 20-minute smoke- and draft-control assemblies, doorway openings shall be protected by doors having a fire-protection rating of not less than 20 minutes or by a minimum $1^3/_8$-inch-thick (34.9 mm) solid-bonded wood-core door or an equivalent insulated steel door. In such case, the frames need not have a fire-resistive time period. Doors shall be maintained self-closing or shall be automatic closing by activation of a smoke detector.

Transoms and openings other than doors from corridors to rooms shall be protected as required by the Building Code. When the code under which the building was constructed permitted unprotected transoms or other unprotected openings, other than doors, such transoms or openings shall be covered with a minimum of ¾-inch-thick (19.1 mm) wood structural panel or ½-inch-thick (12.7) gypsum wallboard or equivalent material on the room side. Openings with a fixed wired glass set in steel frames are permitted in corridor walls and ceilings.

EXCEPTION: Existing corridor walls, ceilings and opening protection not in compliance with the above may be continued when the building is protected with an approved automatic sprinkler system throughout. Such sprinkler system may be supplied from the domestic water-supply system, provided the system is of adequate pressure, capacity and sizing for the combined domestic and sprinkler requirements. [2]

4. Fire Escapes.

a. *Conditions:* Existing fire escapes complying with this section may be accepted by the building official as one of the required means of egress. The fire escape shall not take the place of stairways required by the codes under which the building was constructed. Fire escapes shall be subject to reinspection as required by the building official. The building official may require documentation to show compliance with the requirements of this section.
Fire escapes shall comply with the following:

1. Access form a corridor shall not be through an intervening room.
   EXCEPTION: Access through an intervening room may be permitted if the intervening door is not lockable and an exit sign is installed above the door that will direct occupants to the fire escape.
2. All openings in an exterior wall below or within 10 feet (3048 mm), measured horizontally, or an existing fire escape serving a building over two stories in height shall be protected by a self-closing fire assembly having three-fourths-hour fire-protection rating. When located within a recess or vestibule, adjacent enclosure walls shall not e less than one-hour fire-resistive construction.
3. Egress from the building shall be by an opening having a minimum clear width and height of not less than 29 inches (737 mm). Such openings shall be openable from the inside without the use of a key or special knowledge or effort. The sill of an opening giving access to the fire escape shall not be more than 30 inches (762 mm) above the floor of the building or balcony.
4. Fire escape stairways and their balconies shall support their dead load plus a live load of not less than 100 pounds per square foot (4788 Pa) or concentrated load of 300 pounds (1334 N) placed anywhere on the balcony or stairway to produce the maximum stress conditions. The stairway shall have a slope not to exceed 60 degrees from the horizontal and shall have a minimum width of 18 inches (457 mm). The stairway shall be provided with a top and intermediate railing on each side. Treads shall not be less than 4 inches (102mm) in width and the rise between treads shall not exceed 10 inches (254 mm). All stairway and balcony railings shall support a horizontally applied force of not less than 50 pounds per lineal foot (218.9 N/m) or railing or a concentrated load of 200 pounds (890 N) placed anywhere on the railing to produce the maximum stress conditions.
5. Fire escape balconies shall not be less than 44 inches (1118 mm) in width with no floor opening greater than 5/8 inch (15.9 mm) in width except the stairway opening. Stairway openings in such balconies shall not be less than 22 inches by 44 inches (559 mm by 1118 mm). The guardrail of each balcony shall not be less than 36 inches (914 mm) high with not more than 9 inches (229 mm) between intermediate rails.
6. Fire escapes shall extend to the roof or provide an approved gooseneck ladder between the top floor landing and the roof serving buildings four or more stories in height having roofs with a slope not exceeding 4 units vertical in 12 units horizontal (33.3% slope). Such ladders shall be designed and connected to the building to withstand a horizontal force of 100 pounds per lineal foot (1459 N/m); each rung shall support a concentrated load of 500 pounds (2224 N) placed anywhere on the rung to produce the maximum stress conditions. All ladders shall be at least 15 inches (381 mm) in clear width, be located within 12 inches (305 mm) of the building and shall be placed flat wise relative to the face of the building. Ladder rungs shall be ¾ inch (19.1 mm)

in diameter and shall be located 10 inches to 12 inches (254 mm to 305 mm) on center. Openings for roof access ladders through cornices and similar projections shall have minimum dimensions of 30 inches by 33 inches (762 mm by 838 mm).

7. The lowest balcony shall not be more than 18 feet (5486 mm) from the ground. Fire escapes shall extend to the ground or be provided with counterbalanced stairs reaching to the ground.
8. Fire escapes shall be kept clear and unobstructed at all times and maintained in good working order.
9. The fire escape shall have a clearance from electrical service conductors as required by the Electrical Code. [3]

b. *Materials:*

c. *Installation:*

5. Stairways.

a. *Existing Conditions:*

b. *Materials:*

c. *Installation or Repair:* Existing winding or spiral stairways may serve as one means of egress from a building, provided that a complying handrail is located at the stair's outside perimeter. A winding or spiral stairway may not be the principal means of egress when used in conjunction with a fire escape as a second means of egress. Means of egress width shall comply with the Building Code. Circular stairways complying with the Building Code shall be acceptable as a means of egress.[4]

6. Smoke Alarms.

a. *Conditions:* Individual dwelling units shall be provided with smoke alarms in the following areas: each sleeping room; outside each sleeping area in the vicinity of bedrooms, on each level including basements and cellars, but not crawl spaces or uninhabitable attics.[5]

b. *Materials:* A smoke alarm that is approved by the NFPA.

c. *Installation:* The smoke alarms shall be interconnected and hard wired. Exception: Smoke alarms in existing areas shall not be required to be interconnected and hard wired where the alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space, or basement available which could provide access for hard wiring and interconnection without the removal of interior finishes.

---

[1] Universal Code for Building Conservation Section 402.3
[2] Universal Code for Building Conservation Section 402.4
[3] Universal Code for Building Conservation Section 402.5
[4] Universal Code for Building Conservation Section 402.6
[5] International Residential Code for One- and Two-Family Dwellings Section R317

Exterior Wall Assembly Standards

A. Exterior Surface

1. *Conditions:* The exterior surface of any exterior wall assembly shall comply with the following:
    a. All exterior walls shall be weather tight as to prevent moisture from entering the building and preventing heat from leaving the building as best as possible.[1]
    b. The distance between the bottom of wood siding elements shall be at least six inches from grade level to avoid moisture damage. [2]
    c. All sidings and exterior wall coverings shall be free of loose, cracked, or broken pieces. Painted surfaces shall be free of peeling or blistering. If painted surfaces display signs of peeling or blistering additional investigations of the rest of the wall assembly shall be made. The failing paint can be symptoms of moisture problems within the wall assembly that can jeopardize the durability of the wall. [3]
    d. All wood siding or exterior wall coverings shall comply with Part C relating to Wood Assembly Performance.

2. *Materials:* Wood or vinyl siding and masonry units.

3. *Installation or Repairs:* Decayed wood members shall be repaired or replaced (if siding is replaced it is considered removed for Part B). Failing paint shall be stripped and repainted in compliance with the HUD Lead Based Paint requirements. Any siding that has mold or is rotting towards the bottom shall put more separation between the ground and the bottom of the siding or improve the site drainage so excess bulk moisture (rain water) does further create moisture problems. Any broken or damaged segments of vinyl siding should be repaired or replaced, which ever is more practical.

B. Sub-surface Characteristics

1. *Conditions:* If for any reason the siding or any exterior wall coverings are removed or replaced at any time during the rehabilitation process the following conditions shall be met:
    a. Wall sheathing shall comply with Part C relating to Wood Assembly Performance.
    b. Studs, headers, footers, top plates, and sill plates shall comply with Part C relating to Wood Assembly Performance.
    c. Wall insulation shall be compliant with the appropriate parts of the Energy Section.
    d. Vapor barriers shall be located on the interior side of the wall insulation and create a continuous barrier separating the insulation from the interior of the building with little to no openings and separations within the barrier.

2. *Materials:* Engineered lumber, Dimensional lumber, insulation, vapor barriers, and foam board insulation.

3. *Installation or Repairs:* See Conditions.

4. *Recommended Installation or Repairs:* If framing is replaced or repaired, it is recommended that 2” x 6” studs are used. The extra volume allows for more insulation in the walls. If new insulation is put in the wall cavities it is recommended that cellulose

is used for its air sealing properties in addition to having a slightly larger R value than fiberglass batts.

C. Wood Assembly Performance

Structural Strength

1. *Conditions:* Wood assemblies shall be able to support loads it is exposed to without excessively bowing or leaning.

2. *Materials:* Dimensional lumber and engineered lumber.

3. *Installation or Repairs:* If wall assemblies bow or lean it may be due to failing wood members. Two common sources of failure are decay and excessive cuts and holes. Both can weaken the strength of the wood. However, if the wall was poorly designed and is not decaying or excessively cut or drilled it should still be reinforced to correctly support the structures it holds.

Moisture and Decay

1. *Conditions:* Wood members shall be free from decay.[4]

2. *Materials:* Dimensional lumber, engineered lumber and epoxy.

3. *Installation or Repairs:* Wood can be tested for decay by picking at it with a sharp object. If the wood member breaks into clumps of dark brown, black, or grey instead of splintering the wood shows signs of decay and is rotting. Also, if the wood makes a dull, hollow sound when it is rapped upon the wood beneath the surface may also be decayed and in need of repair or replacement. Decayed wood can be repaired by sistering the wood to other members. Or if the rot is small enough to be cleared from the wood, an epoxy can be used to fill in where the rot was. If repair is required due to decay, the source of the moisture causing the decay must also be repaired.

Excessive Drilling and Notching

1. *Conditions:* Any exterior wall stud may be cut or notched to a depth no more than 25 percent of its width. Any stud may be drilled or bored as long as the diameter of the hole is no greater than 40 percent of the stud width. The edge of the stud and the hole cannot be located in the same section as a cut or notch.
   If piping or ductwork causes the top plate to be cut more than 50 percent of its width a galvanized metal tie at least 0.054 inches thick (16 gauge) and 1.5 inches wide shall be fastened to each plate across and to each side of the opening with at least 16d nails. The metal tie is not needed when wood structural panel sheathing covers the entire side of the wall with the notch or cut.[5]

2. *Materials:* Dimensional lumber.

3. *Installation or Repairs:* When piping or ductwork is placed in or partially in an exterior wall … necessitating a cutting of the top plate by more than 50 percent of its width, a galvanized metal tie not less than 0.054 inches thick (16 gauge)

and 1.5 inches wide shall be fastened to each plate across and to each side of the opening with not less than six 16d nails. Refer to figure R602.6.1 in the IRC for an illustrative example. The galvanized metal tie is not required when wood structural panel sheathing covers the entire side of the wall with the notch or cut.

D. Fireblocking

1. *Conditions:* Fireblocking shall be provided to cut off all concealed draft openings and to form an effective fire barrier between stories, the top story and the roof space.[6]

2. *Materials:* Two inch lumber, or two thicknesses of one inch lumber with broken lap joints, or one thickness of $^{23}/_{32}$ inch wood structural panels with joints backed by $^{23}/_{32}$ inch wood structural panels, or one thickness of $^{3}/_{4}$ inch particleboard with joints backed by $^{3}/_{4}$ inch particleboard, $^{1}/_{2}$ inch gypsum board, or $^{1}/_{4}$ inch cement-based millboard.[7] Fire Caulk shall be used to fill smaller holes and gaps that rigid materials cannot.

3. *Installation:* Fireblocking shall be provided in wood frame construction in the following locations:
   a. In concealed spaces of stud walls and partitions, including furred spaces, at the ceilings and floor level and at 10 foot intervals both vertically and horizontally. Fire Caulk shall be allowed as fireblocking in walls constructed using parallel rows of studs or staggered studs.
   b. At all interconnections between concealed vertical and horizontal spaces such as soffits, drop ceilings, and cove ceilings.
   c. In concealed spaces between stair stringers at the top and bottom of the run. Enclosed accessible space under stairs shall have walls, under stair surface and any soffits protected on the enclosed side with $^{1}/_{2}$ inch gypsum board.
   d. At openings around vents, pipes, and ducts at ceilings and floor level. [8]
   e. All spaces between chimneys and floors and ceilings through which chimneys pass shall be fireblocked with noncombustible material securely fastened in place. The fireblocking of spaces between chimneys and wood joists, beams, or headers shall be to a depth of one inch and shall only be placed on strips of metal lath laid across the space between the combustible material and the chimney.
   f. Fireblocking of cornices of a two-family dwelling is required at the line of dwelling unit separation. [9]

E. Masonry Performance

1. *Conditions:* Mortar shall be free of cracks and crumbling. Mortar erosion must be less than $^{1}/_{4}$ an inch.[10]

2. *Materials:* Bricks, masonry units, and mortar.

3. *Installation or Repairs:* If mortar does not comply it shall be repointed to match existing mortar joints. If the mortar failure is due to moisture problems the source of the moisture shall be determined and measures shall be taken to prevent future masonry failures. Continuous weep holes, flexible sealants, and reinforcing poorly supported point loads and other means can be done to repair and prevent future failures.[11]

---

[1] IHFA Rehabilitation Standards, Section 3-4
[2] Residential Rehabilitation Inspection Guide, pg 10

[3] Residential Rehabilitation Inspection Guide, pg 11
[4] The Rehab Guide Volume 5: Partitions, Ceilings, Floors & Stairs, pg 16
[5] IRC 2000, R602.6.1
[6] IRC 2000, R602.8
[7] IRC 2000, 602.8.1.2 (minus sub-sections R602.8.1.1 & R602.8.1.2) which get into detail about fiberglass batts
[8] IRC 2000, R314.8
[9] IRC 2000, R1001.16
[10] IHFA Rehabilitation Standards 1993, Section 3-4 and The Rehab Guide Volume 2: Exterior Walls, pg 24
[11] The Rehab Guide Volume 2: Exterior Walls, pg. 24

Energy Efficiency

1. Exterior Walls.

a. *Conditions:* The sum of the thermal resistance of cavity insulation plus insulating sheathing (if used) shall meet or exceed R-18.[1]

b. *Materials:* R-18 fiberglass batt insulation or the equivalent in cellulose blow insulation.

c. *Installation:* This standard must be met in the following instances:
   1. New walls,
   2. Walls that have become exposed during rehabilitation,
   3. If the exterior covering is anytime removed.

2. Attics/Ceilings.

a. *Conditions:* Attic areas should have a minimum of R-38 insulation. Any attic walls that connect to an interior space shall be insulated at a minimum of R-18.

b. *Materials:* R-38 fiberglass batts or equivalent in cellulose blow insulation.

c. *Installation:* Insulation should be installed in accordance to manufacturer's specifications. All insulation in the attic should meet the appropriate fire safety codes.

3. Basements/Crawl Spaces.

a. *Conditions:* Where the basement is not considered a conditioned space, either the basement wall or the ceiling(s) separating the basement from the conditioned space shall be insulated to R-18.[2] There should be either interior or exterior insulation covering the basement/crawl space walls with an R-value of R-18. Where the basement is considered a conditioned space, the basement walls shall be insulated to R-18.

b. *Materials:* R-18 fiberglass batts, or equivalent rigid insulation board.

c. *Installation:* Interior insulation is recommended because installation is easier to install and may be more cost effective. Insulation should be installed in accordance to manufacturer's specifications.

4. Floors.

a. *Conditions:* Floor insulation should be installed in the lowest floor over an unconditioned space. Floor insulation should have and R-value of R-18 or higher.

b. *Materials:* R-18 fiberglass batts.

c. *Installation:* Insulation should be installed in accordance to manufacturer's specifications.

5. Ductwork.

a. *Conditions:* All supply and return air ducts and plenums shall be insulated with a minimum of R-5 insulation when located in unconditioned spaces and with a minimum of R-8 insulation when located outside the building envelope. When located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation. Exceptions:
   1. When located within equipment.
   2. When the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15^{o}F (8^{o}C).[3]

b. *Materials:*

c. *Installation:* Insulation should be installed in accordance to manufacturer's specifications.

6. Piping.

a. *Conditions:* All piping serving as part of a heating or cooling system shall be thermally insulated.

b. *Materials:* The insulation should meet the following specifications.
   1. Steam piping. 1.5"or smaller in diameter – 1.5 inch think insulation.
      Piping greater than 1.5" – 3 inches thick;
   2. Hot water pipes. 1.5"or smaller in diameter – 1 inch thick.
      Piping greater than 1.5" – 2 inches thick;
   3. Chilled water, brine or refrigerant. 1.5"or smaller in diameter – 1 inch thick.
      Piping greater than 1.5" – 1.5 inches thick.[4]

c. *Installation:*
   Exceptions:
   1. Factory-installed piping within HVAC equipment tested and rated;
   2. Piping that conveys fluids that have a design operation temperature range between 55°F (13°C) and 105°F (41°C);
   3. Piping that conveys fluids that have not been heated or cooled through the use of fossil fuels or electric power;
   4. Runout piping not exceeding 4 feet (1219 mm) in length and 1 inch (25 mm) in diameter between the control valve and HVAC coil.[5]
   5. Piping that is not accessible during the period of rehabilitation.

7. Water Heater.

a. *Conditions:*

b. *Materials:* Appropriate Materials.

c. *Installation:* When a water heater is repaired or replaced, the following standards shall be met:
   1. There shall be a heat trap on both the inlet and outlet of the water heater unless the water heater has an integral heat trap or is part of a circulating system.[6]
   2. The water heater should have insulation wrap that will make the total R-value at least R-15.
   3. It is recommended to put them on top of an insulated platform made of 2" foamboard and plywood when possible.[7]

8. Air Sealing.

a. *Conditions:* "Exterior joints, seams or penetrations in the building envelope, that are sources of air leakage, shall be sealed with durable caulking materials, closed with gasketing systems, taped or covered with moisture vapor-permeable house-wrap." [8]

b. *Materials:* Appropriate materials.

c. *Installation:* "All materials used should be installed in accordance with manufacturer's specifications. Sealing materials spanning joints between dissimilar construction materials shall allow for differential expansion and construction of the construction materials."[9]

[1] International Energy Conservation Code Section 502.2.4.1
[2] International Energy Conservation Code Section 602.1.5
[3] International Energy Conservation Code Section 803.2.8
[4] International Energy Conservation Code Table 803.3.7
[5] International Energy Conservation Code Section 803.3.7
[6] International Energy Conservation Code Section 504.7
[7] Krigger *Residential Energy* Page 201
[8] International Energy Conservation Code Section 502.1.4.2
[9] International Energy Conservation Code Section 502.1.4.2

Electrical

1. General.

a. *Existing Condition:* There shall be a minimum service of 100-ampere per dwelling unit.

b. *Materials:*

c. *Installation or Repair:*
1. Fused service shall be replaced by a circuit breaker.
2. Service-drop conductors shall meet current code requirements.
3. Services shall be labeled.
4. Wooden molding raceways must be removed and replaced with metal raceways.
5. All broken or cracked switches and cover plates shall be replaced. Push button and rotary switches shall be replaced with toggle switches.[1]

2. Wiring.

a. *Existing Condition:* Existing wiring and equipment shall be in proper operating condition and pose no health or safety risk.

b. *Materials:* 12/2 w/ground romax.

c. *Installation or Repairs*:
1. All exposed knob-and-tube wiring in basements, attics and other areas shall be replaced
2. All wiring in areas other than the basement and unused attic areas shall be run in walls, wire mold or in conduit.
3. A new or old service shall be grounded to a ground rod and the metal cold water pipe, and the water meter shall be jumped as required.
4. Deteriorated insulation shall be fixed.
5. Circuit extensions made with flexible cord wiring in lieu of permanent wiring shall be eliminated.

3. Receptacles.

a. *Condition:* All broken or cracked receptacles and cover plates shall be replaced.

b. *Materials:* All new receptacles shall be properly grounded, be on 12-gauge wire (except taps) and be 20-ampre or 15-ampre fused.

C. *Installation or Repairs:*
1. Replacement of an existing non-utility or non-appliance two-prong receptacle may be with a 15-ampre non-grounded receptacle. If a 15-ampre grounded receptacle is used instead, it shall be properly grounded.
2. Floor receptacles shall be moved to the wall. Metal plates shall be used to cover the floor opening.
3. Existing baseboard receptacles properly set are acceptable.
4. Any equipment or appliances with grounded plugs shall have immediate access to a proper size grounded receptacle.

4. Lighting.

a. *Existing Condition:* A permanent ceiling light fixture controlled by a wall switch is required in the living room, kitchen, bathroom, basement, laundry area, stairwells and hallways, other habitable rooms. There shall also be a light fixture to provide illumination for the exterior means of egress.

b. *Materials:* It is recommended that Energy Star rated compact fluorescent lights (cfl's) or lighting fixtures be used when possible.

c. *Installation or Repair:* Porcelain fixtures, with or without pull chains, shall only be allowed in garages, basements, unimproved attic areas, utility areas and closets. There shall be eighteen inches clearance from the nearest combustible material.

4. Appliances.

a. *Existing Condition:* All 220-volt appliances or equipment except baseboard heating units shall be on separate circuits.

b. *Materials:* Energy Star rated appliances whenever possible.

c. *Installation or Repair:* Baseboard heating units shall be installed, located and maintained according to manufacturer's specifications.

[1] 1997 IHFA Rehab Standards